

---

Citation:

Tee, JC and Coopoo, Y and Lambert, MI (2015) Movement, impact and pacing characteristics of South African professional rugby players. In: South African Sports Medicine Association (SAMSA) 2015, 20 October 2015 - 22 October 2015.

Link to Leeds Beckett Repository record:

<https://eprints.leedsbeckett.ac.uk/id/eprint/4478/>

Document Version:

Conference or Workshop Item (Presentation)

---

Creative Commons: Attribution 4.0

The aim of the Leeds Beckett Repository is to provide open access to our research, as required by funder policies and permitted by publishers and copyright law.

The Leeds Beckett repository holds a wide range of publications, each of which has been checked for copyright and the relevant embargo period has been applied by the Research Services team.

We operate on a standard take-down policy. If you are the author or publisher of an output and you would like it removed from the repository, please [contact us](#) and we will investigate on a case-by-case basis.

Each thesis in the repository has been cleared where necessary by the author for third party copyright. If you would like a thesis to be removed from the repository or believe there is an issue with copyright, please contact us on [openaccess@leedsbeckett.ac.uk](mailto:openaccess@leedsbeckett.ac.uk) and we will investigate on a case-by-case basis.

# Movement, Impact and Pacing Characteristics of South African Professional Rugby Players

Jason Tee

Twitter: @JasonCTee

Email: [jasonctee@gmail.com](mailto:jasonctee@gmail.com)





# Professional Rugby Union

Rugby Union is characterised by **short-duration, high-intensity efforts**, interspersed by longer **low-intensity periods of standing, walking and jogging**.



# Diversity of Physical Requirements



The game demands differ for players in different positions.

(Deutsch *et al.*, 2007, J Sport Sci 25:4)

## Groupings

- Forwards vs. Backs
- Tight forward, loose forward, scrumhalf, inside backs, outside backs

## Research Aim

Understand how the physical challenges of the game differ for players in different positions

- What is the difference in movement and impact characteristics of players in different positions?
- What is the influence of match period and position on movement patterns?

# Methods

19 players from a professional South African Rugby team volunteered to take part.

Mean age  $25.5 \pm 2.4$  years;

Body mass  $101.5 \pm 12.2$  kg,

Stature  $1.86 \pm 0.07$ m

Players wore GPS devices in 24 competitive matches through the 2013 rugby season – **105 match participations** were recorded



# Methods – Global Positioning System (GPS)

## Variables measured

- Playing time
- Relative distance ( $\text{m} \cdot \text{min}^{-1}$ ) in speed zones

### Speed bands

Low intensity running  $0\text{--}4\text{m} \cdot \text{s}^{-1}$   
(Standing, walking and jogging)

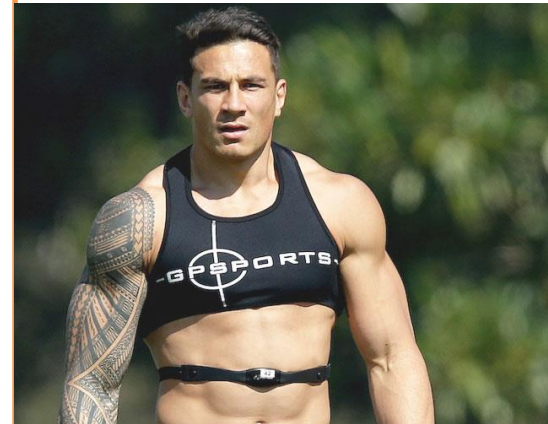
High intensity running  $>4\text{m} \cdot \text{s}^{-1}$   
(Striding and sprinting)

## Accelerometer

- Total impacts **>5G**
- High intensity impacts **>8G**

### SPI Pro GPS unit

(GPSports, Canberra)  
mass = 76g;  
size = 87 x 48 x 20 mm  
5Hz GPS Tracking  
100Hz Tri-axial  
Accelerometer



**SPORTS  
BRA  
FOR MEN**

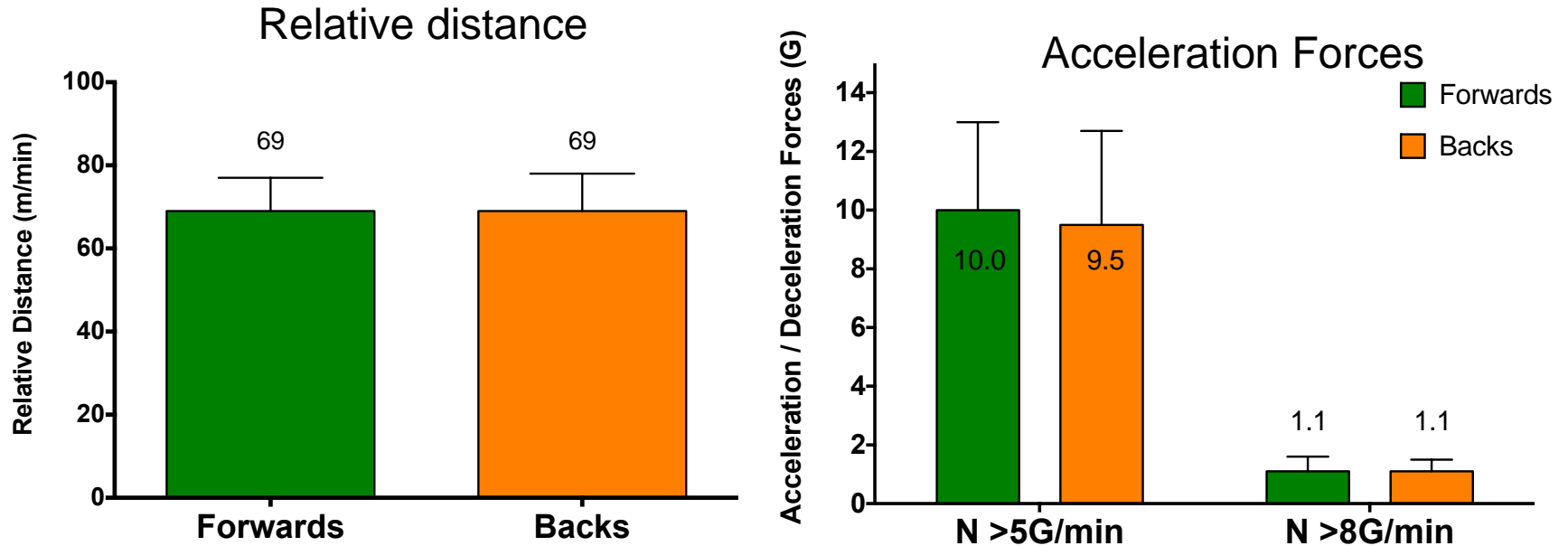


# Results

Typical physical performance characteristics of a professional rugby union player

|   | Mean          | % time        |
|---|---------------|---------------|
| Total Distance ( $\text{m} \cdot \text{min}^{-1}$ )         | $69 \pm 9$    | 100%          |
| Maximum Speed ( $\text{m} \cdot \text{sec}^{-1}$ )          | $8.3 \pm 1.2$ | -             |
| Low intensity running ( $\text{m} \cdot \text{min}^{-1}$ )  | $57 \pm 7$    | $96 \pm 13\%$ |
| High intensity running ( $\text{m} \cdot \text{min}^{-1}$ ) | $12 \pm 5$    | $4 \pm 2\%$   |
| Impacts $>5\text{G}$ ( $\text{N} \cdot \text{min}^{-1}$ )   | $10 \pm 3$    |               |
| Impacts $>8\text{G}$ ( $\text{N} \cdot \text{min}^{-1}$ )   | $1 \pm 0.5$   |               |

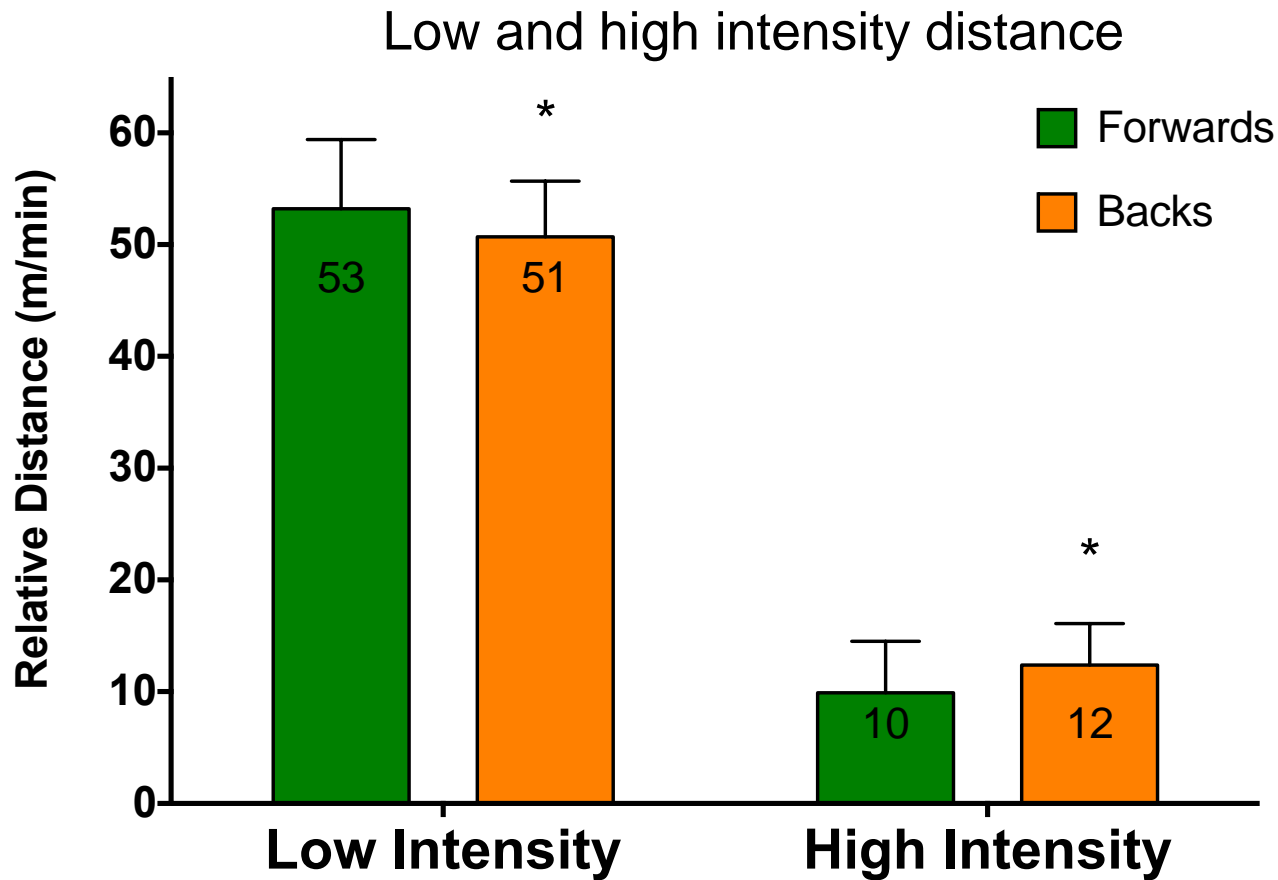
# Comparison – Forwards and Backs



There is **no difference** in the **relative distance** covered or exposure to **acceleration forces** between forwards and backs

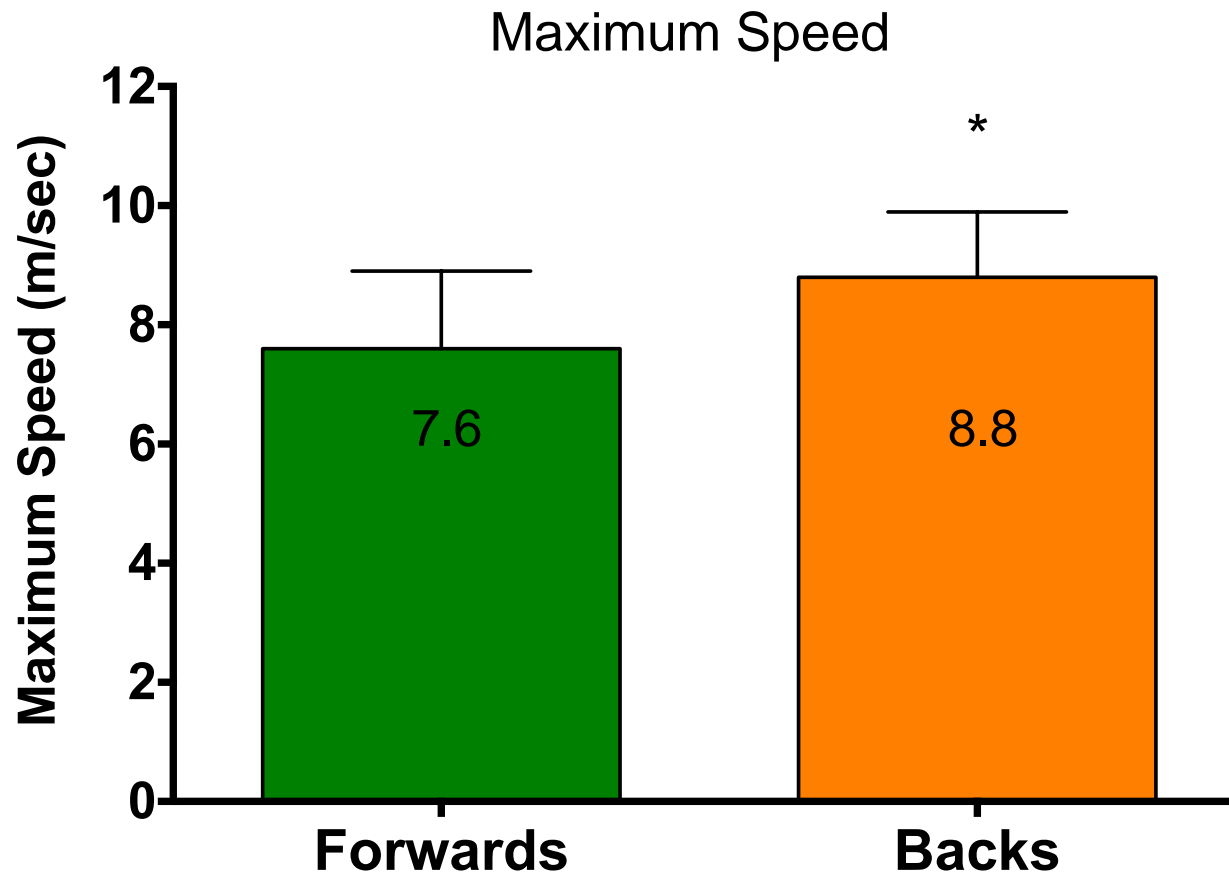


# Comparison – Forwards and Backs



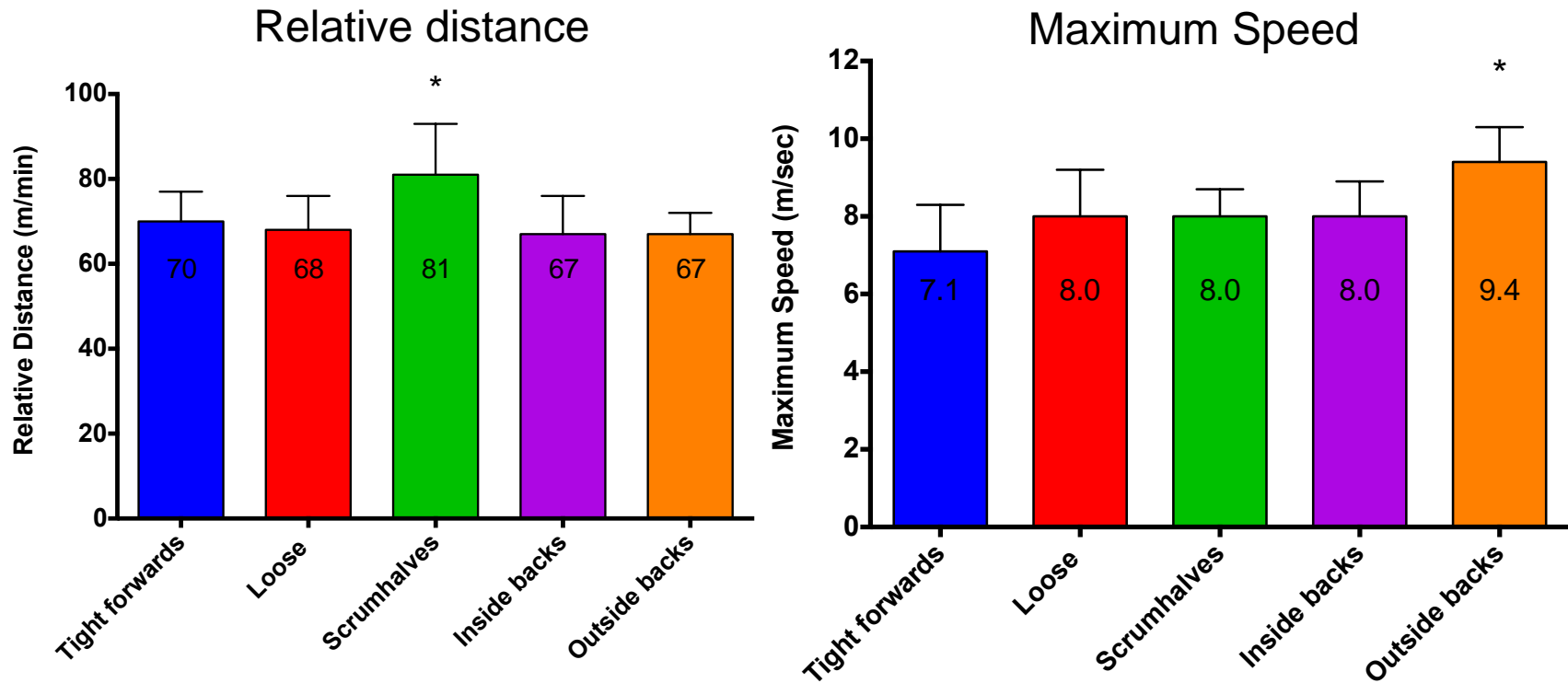
However, there are significant differences in the distances covered in low- and high-intensity speed zones.

# Comparison – Forwards and Backs



Due to their lower maximum speed, forwards are required to work relatively harder than backs throughout match play.

# Comparison – Positional groups

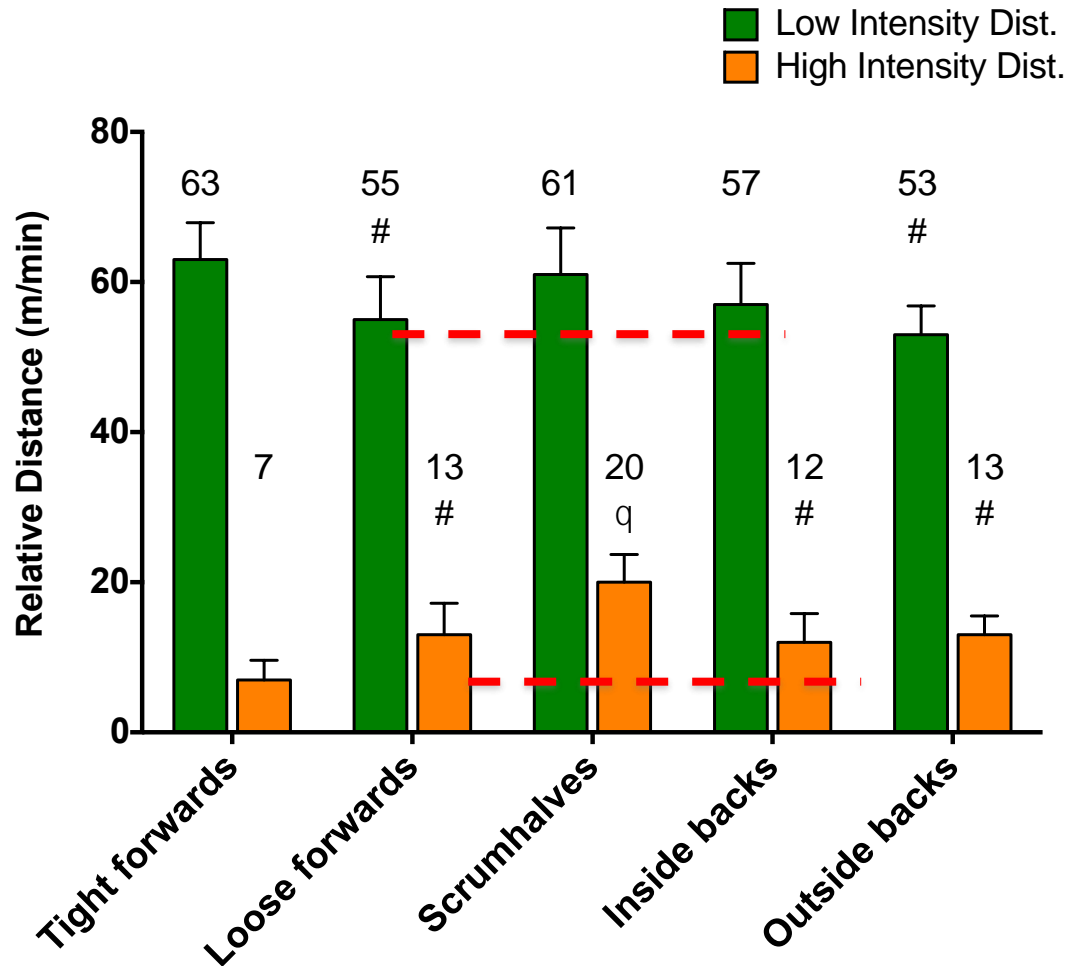


Scrumhalves cover the most relative distance, and outside backs are the fastest position group.



# Comparison – Positional groups

## Low and high intensity distance



**Tight forwards** cover the most **low-intensity** distance, and the **least high-intensity** distance.

**Scrumhalves** cover the most **high-intensity** distance

**No difference** in movement requirements of **loose forwards** and **inside backs**

# indicates different from tight forwards, q indicates scrumhalves different from all other groups



# Comparison – Positional groups

## Inside backs

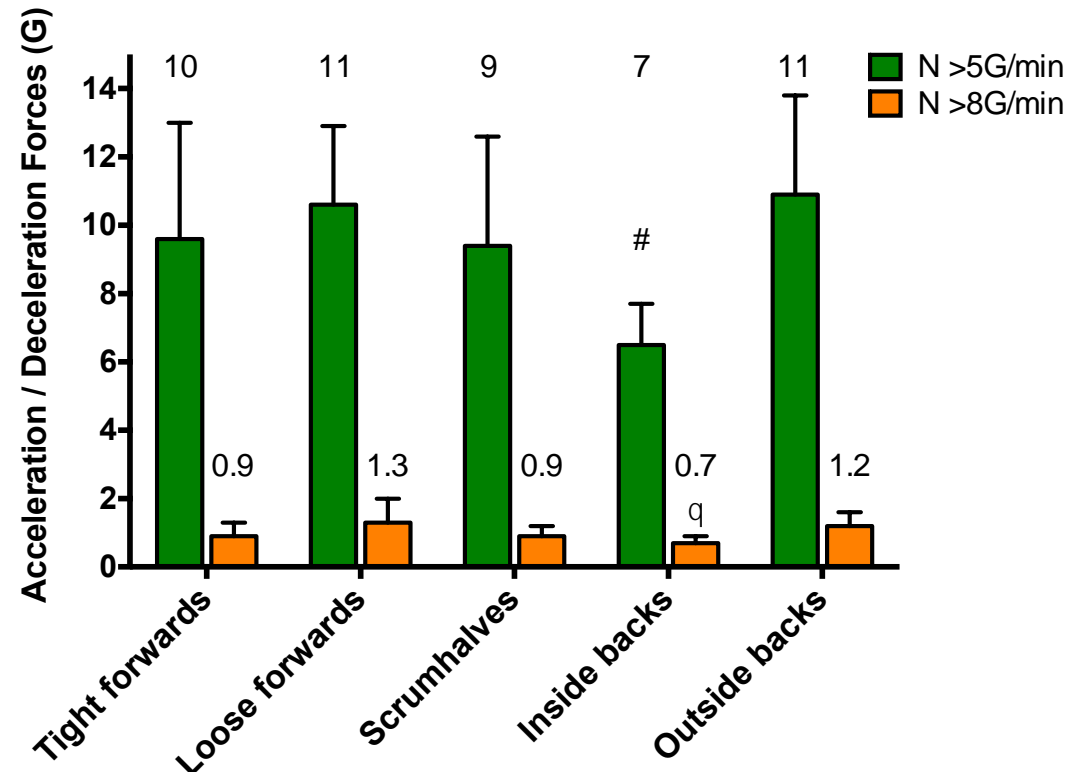
experience **less total and high-intensity acceleration forces** per minute than other positions.

**BUT**

Accelerometer recording do not reflect the actual number of contact (tackle/ruck) events

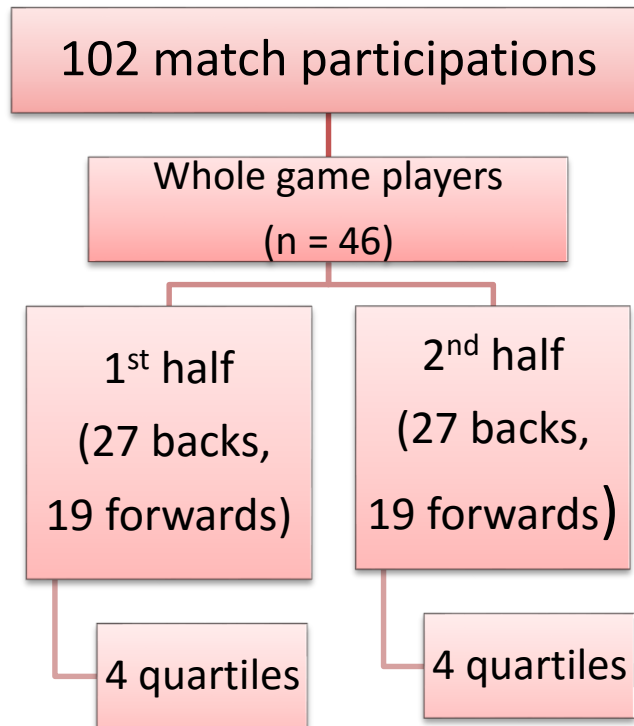
McLellan et al., (2011) JSCR 29(15)

## Acceleration / Deceleration Forces



# indicates different from tight forwards, loose forwards and outside backs;  
q indicates different for outside backs only

## Methods – Pacing strategies for different positions

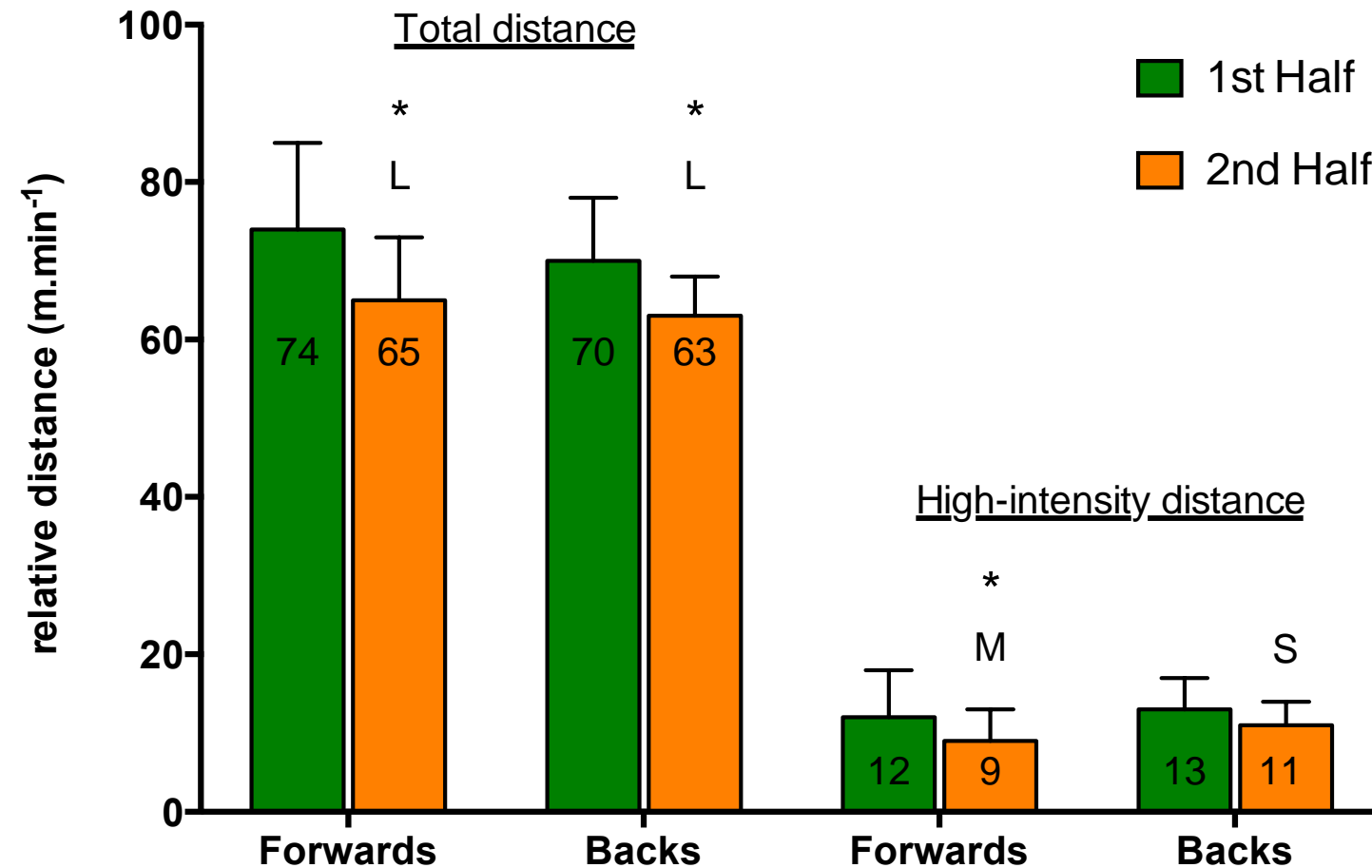


### Statistics

- Factorial ANOVA
- Paired and independent sample t-tests
- Cohen's effect size

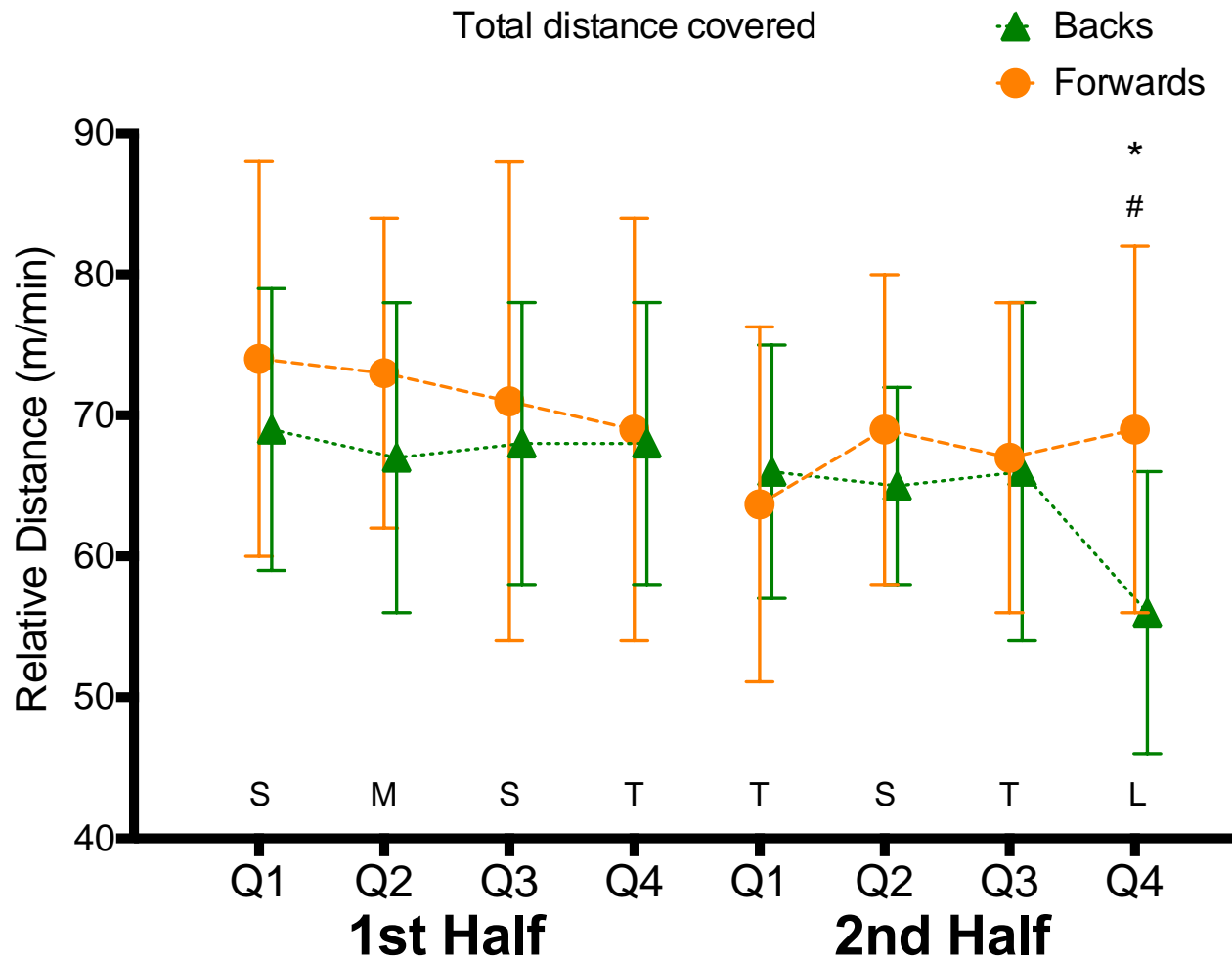


## Results – Effect of half on total and high-intensity distance



\* indicates significant difference from 1st half. T, S, M, L and VL indicate effect sizes trivial (<0.2), small (0.2-0.5), medium (0.5-0.8), large (0.8-1.2) and very large (>1.2) respectively.

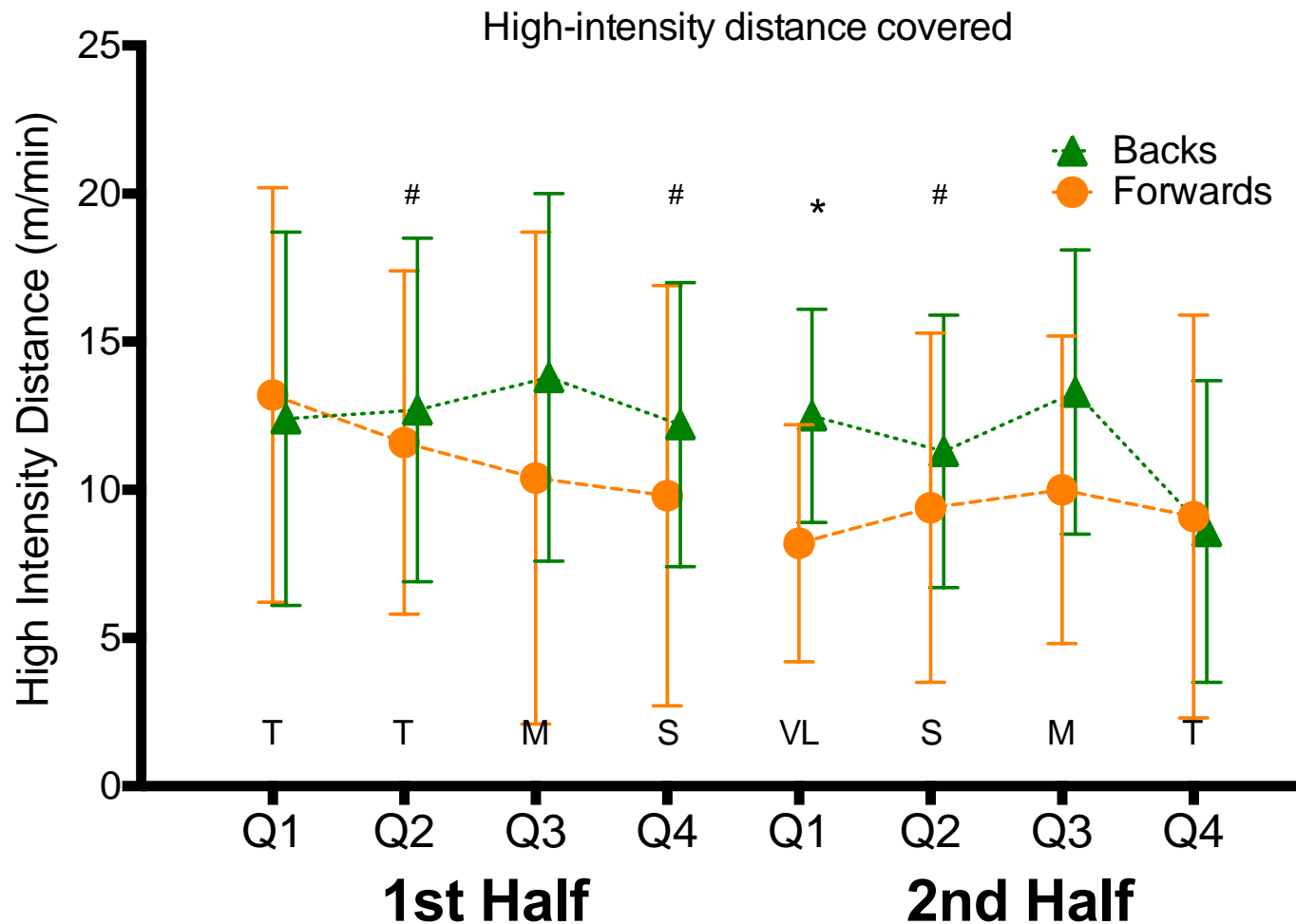
# Results – Total distance per match period



\* indicates significant difference between backs and forwards, # indicated significant different from all othe match periods. T, S, M, L and VL indicate effect sizes trivial (<0.2), small (0.2-0.5), medium (0.5-0.8), large (0.8-1.2) and very large (>1.2) repectively.

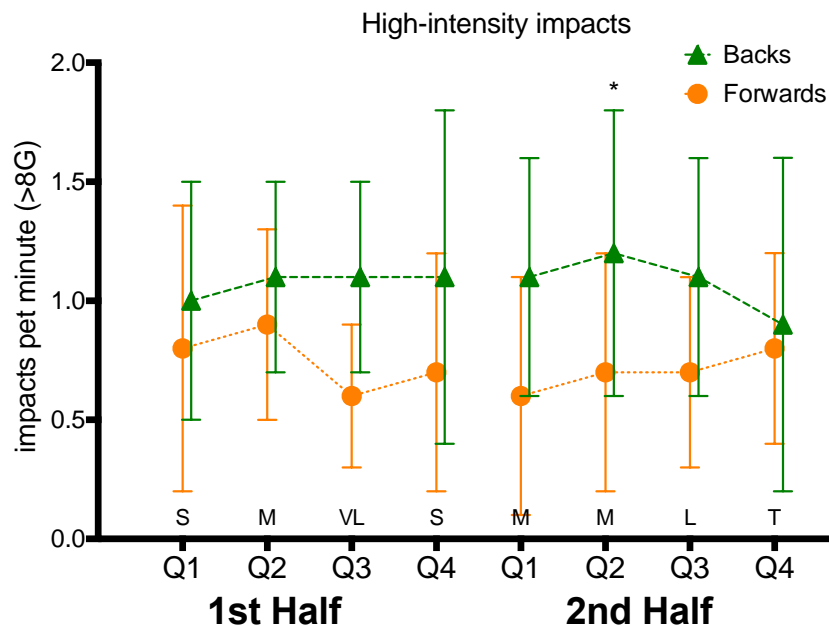
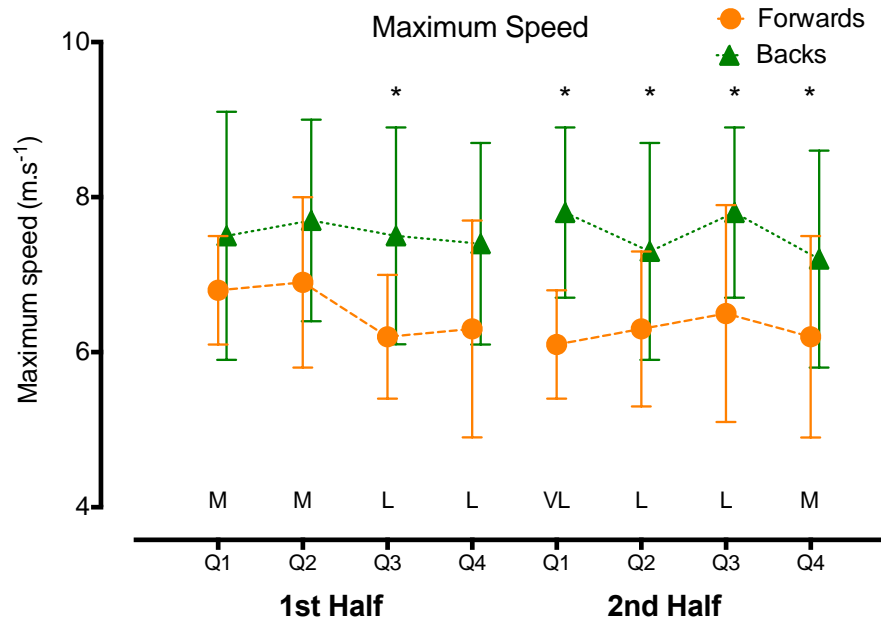


# Results – High-intensity distance per match period



\* indicates significant difference between backs and forwards, # indicates significant different from match period 2nd half Q4. T, S, M, L and VL indicate effect sizes trivial (<0.2), small (0.2-0.5), medium (0.5-0.8), large (0.8-1.2) and very large (>1.2) respectively.

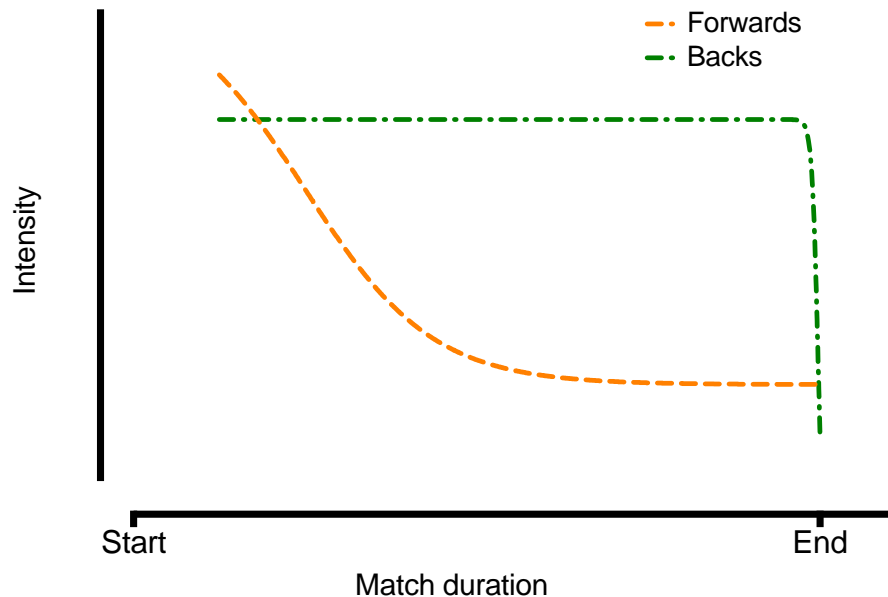
## Results – Maximum speed and High-intensity impacts



The magnitude of difference in the physical outputs of forwards and backs increases during the middle periods of the match.


# Conclusions – fatigue profile

Pacing strategies of rugby union forwards and backs



Backs and forwards demonstrate differing fatigue profiles.

| Pacing profile  |        |
|-----------------|--------|
| Forwards        | Backs  |
| “Slow positive” | “Flat” |

Forwards progressively  total and high-intensity distance, maximum speed, high-intensity acceleration frequency

Backs maintain total and high-intensity distance, maximum speed, and high-intensity acceleration frequency for majority of match

# For the coach - Take home message

- The composition of workloads and rates of fatigue for players in different positions varies, and physical conditioning programs should reflect this.
- Players with greater proximity to the ball (forwards and scrumhalf) jog more, while players in wider positions sprint more often.
- Scrumhalves have unique positional requirements, and carry the greatest workload.
- Loose forwards and inside backs exhibit similar running requirements and can be grouped together for training





# Thank you for listening!

## Acknowledgements

Thank you to the players and staff of the GLRU for their support of the project

This research was partially funded by the National Research Foundation.

Jason Tee

Twitter: @JasonCTee

Email: [jasonctee@gmail.com](mailto:jasonctee@gmail.com)

